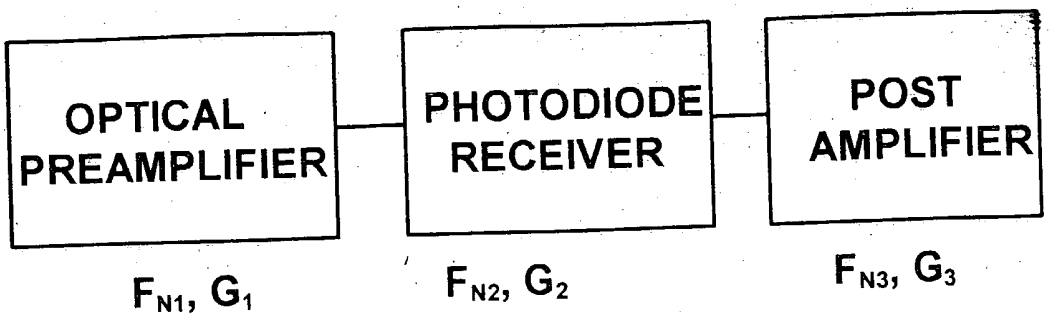


$$F_N\,(dB) = F_{N1} + (F_{N2} - 1)/G_1 + \cdots\cdots$$

$$G\,(dB) = G_1 + G_2 + G_3 + \cdots\cdots\cdots\cdots$$

FIG. 1

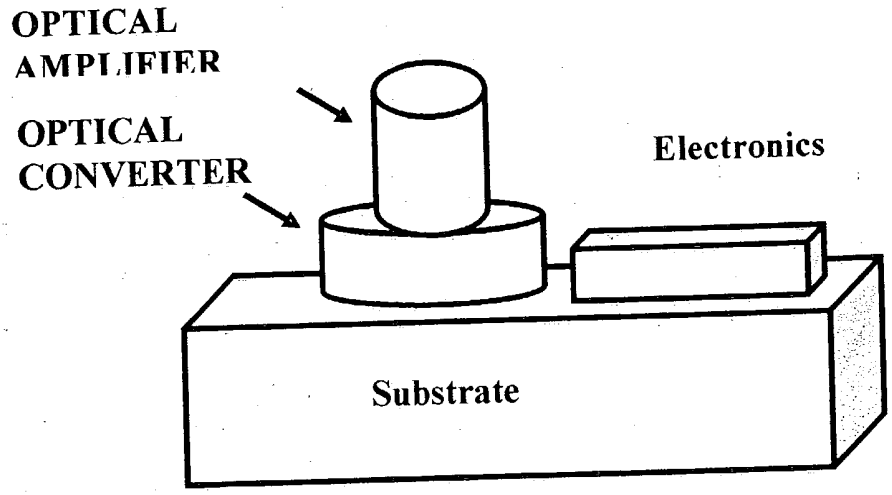


FIG. 2

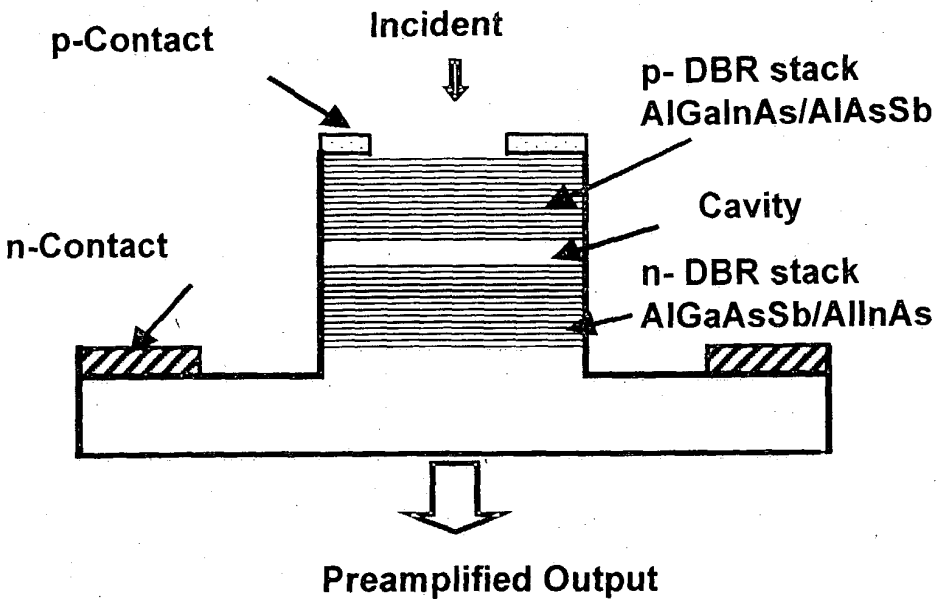

p-Contact
Incident
p- DBR stack
AlGaInAs/AlAsSb
Cavity
n-Contact
n- DBR stack
AlGaAsSb/AlInAs
Preamplified Output

FIG. 3a

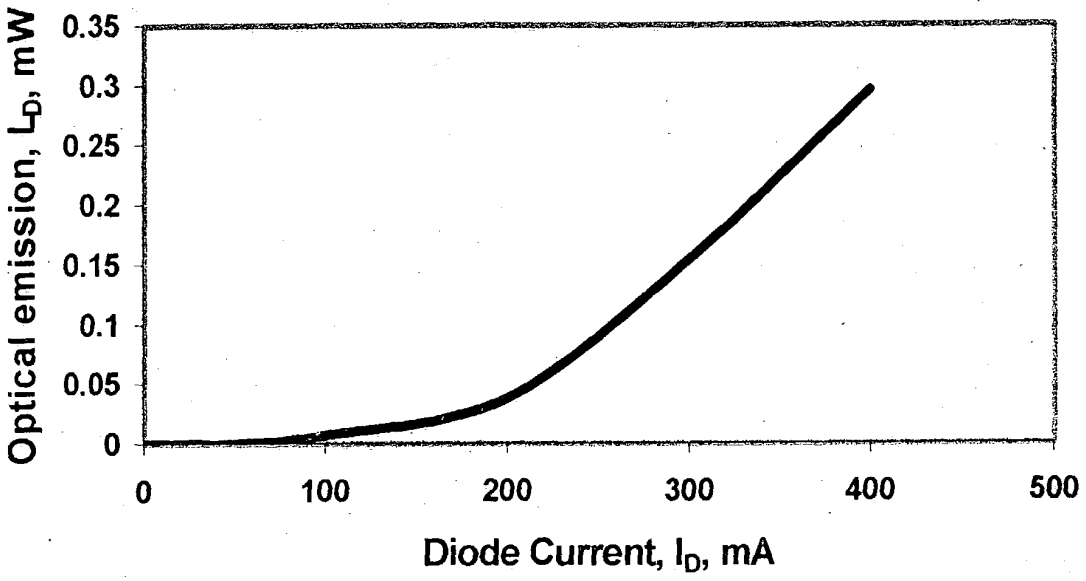

Optical emission, L_D, mW
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
Diode Current, I_D, mA

FIG. 3b

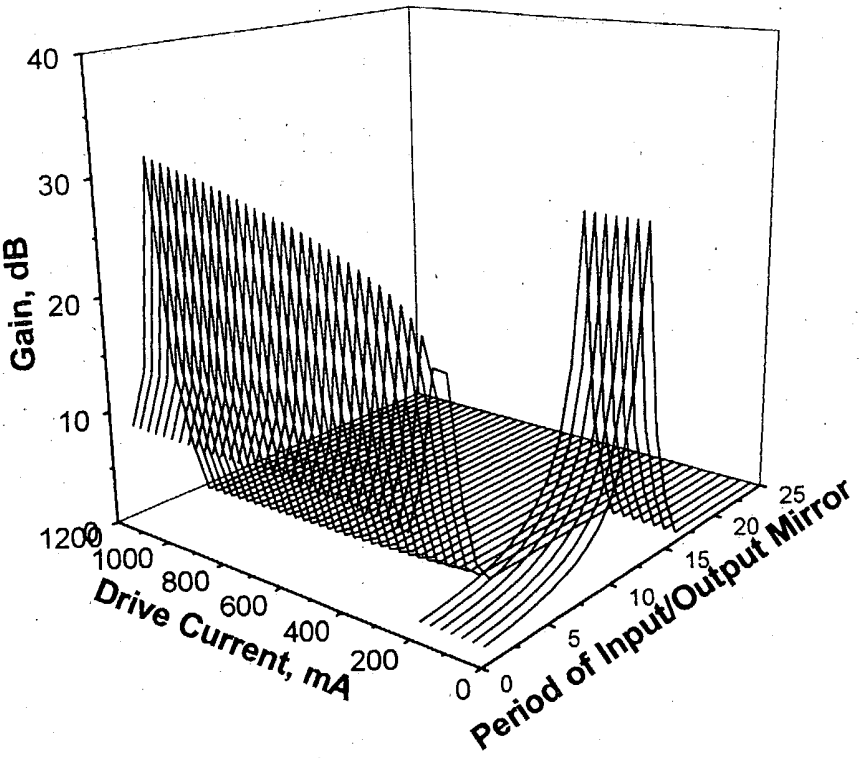

40
30
20
10
Gain, dB
1200
1000
800
600
400
200
0
Drive Current, mA
0
5
10
15
20
25
Period of Input/Output Mirror

FIG. 4a

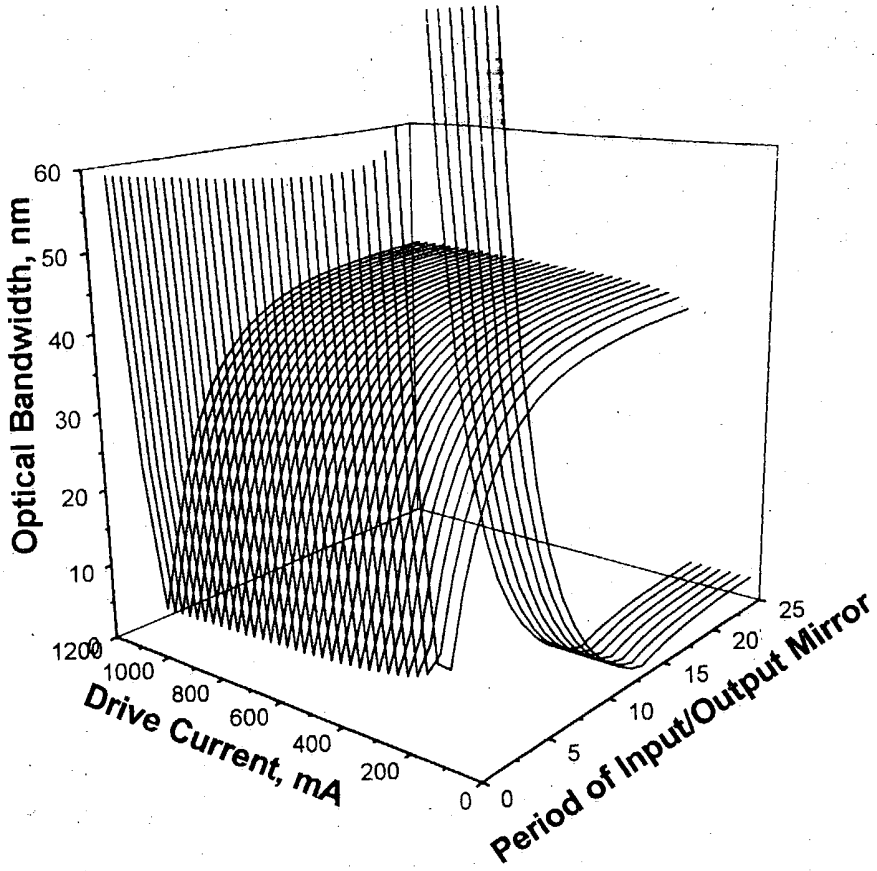

Optical Bandwidth, nm
60
50
40
30
20
10
0
1200
1000
800
600
400
200
0
Drive Current, mA
0
5
10
15
20
25
Period of Input/Output Mirror

FIG. 4b

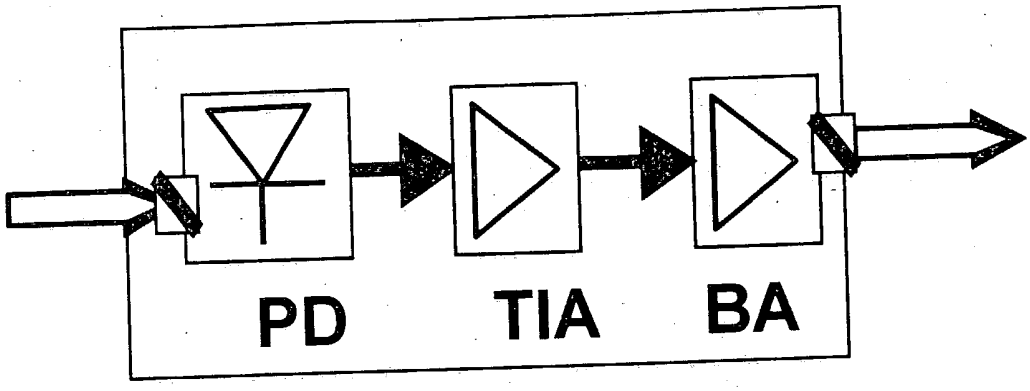


FIG.5

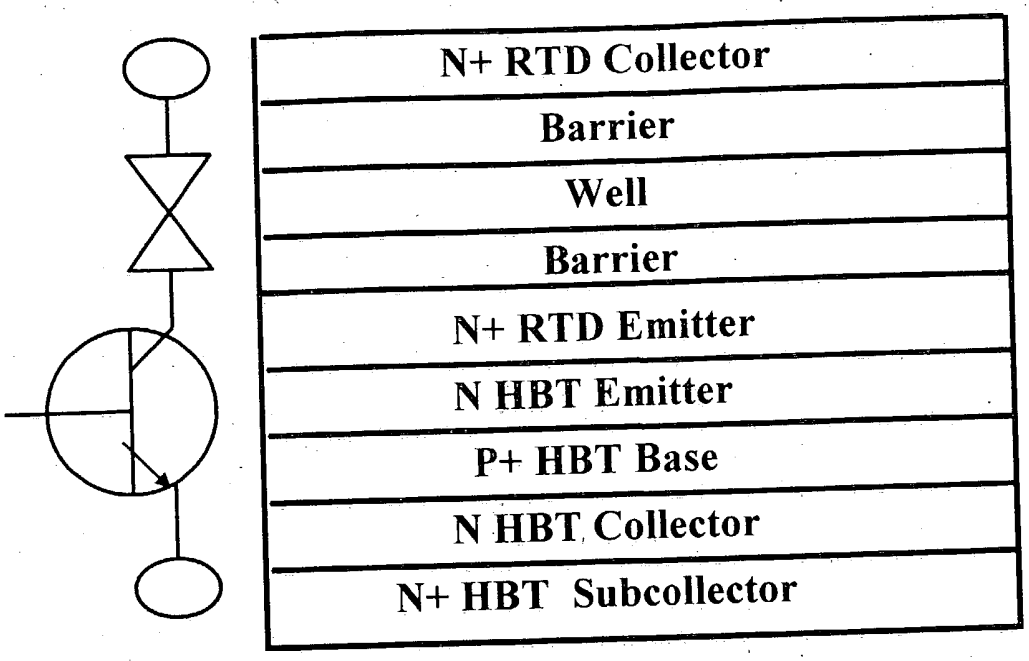

N+ RTD Collector
Barrier
Well
Barrier
N+ RTD Emitter
N HBT Emitter
P+ HBT Base
N HBT Collector
N+ HBT Subcollector

FIG. 6a

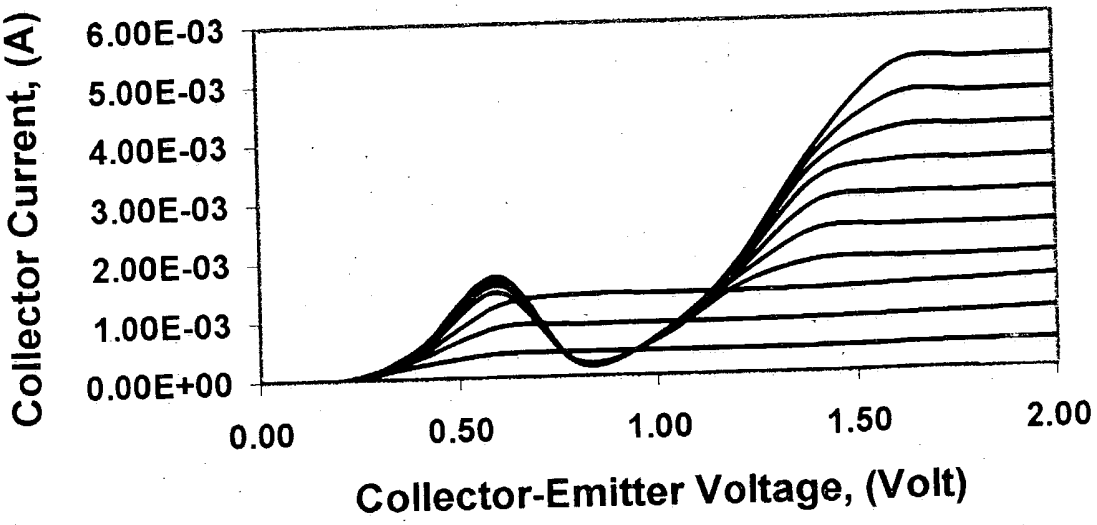

Collector Current, (A)
6.00E-03
5.00E-03
4.00E-03
3.00E-03
2.00E-03
1.00E-03
0.00E+00
0.00
0.50
1.00
1.50
2.00
Collector-Emitter Voltage, (Volt)

FIG. 6b

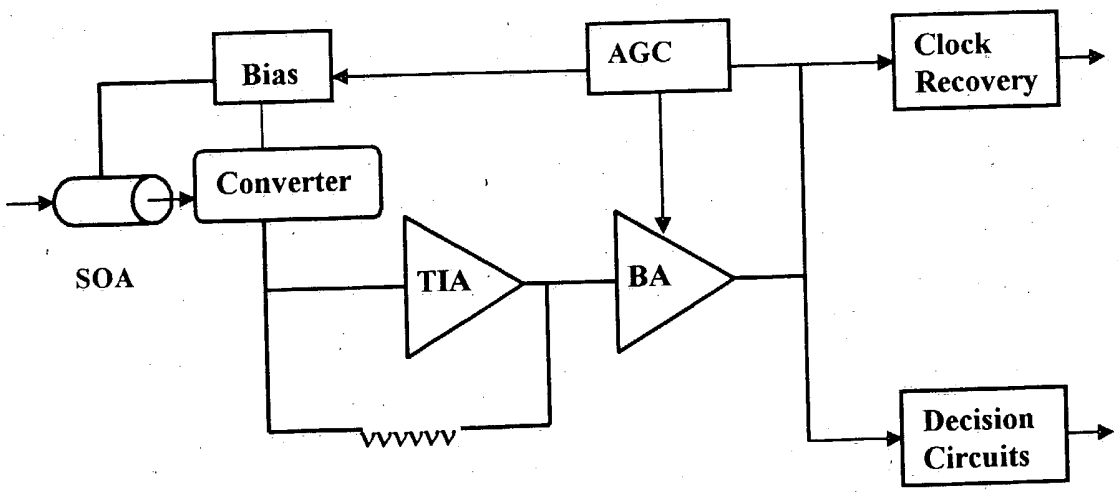

Bias
AGC
Clock Recovery
Converter
SOA
TIA
BA
Decision Circuits

FIG.7

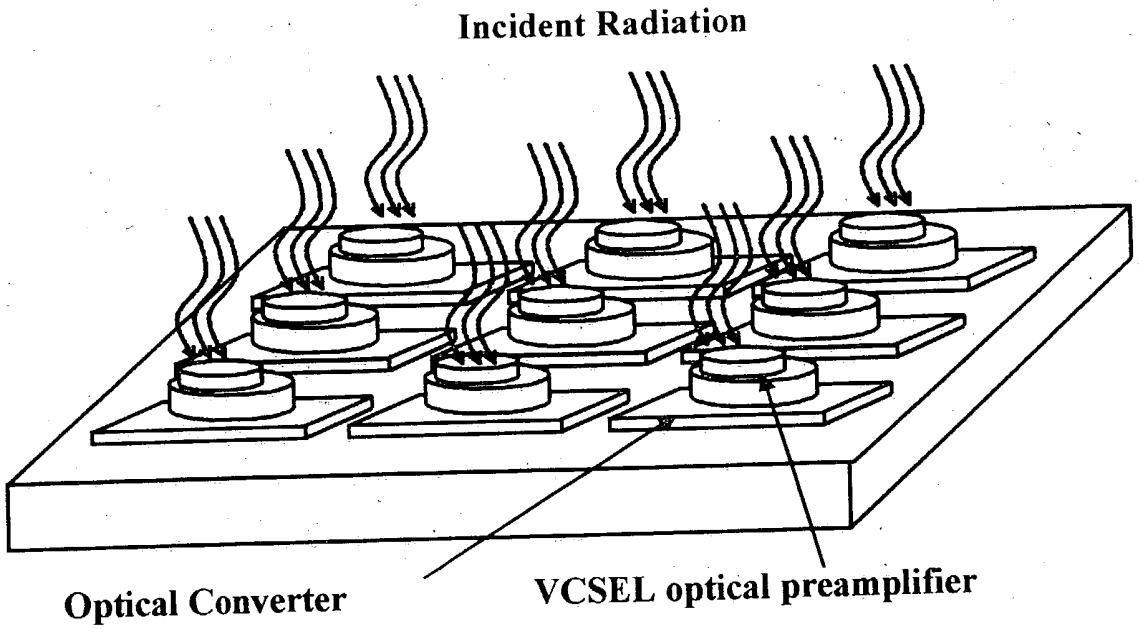
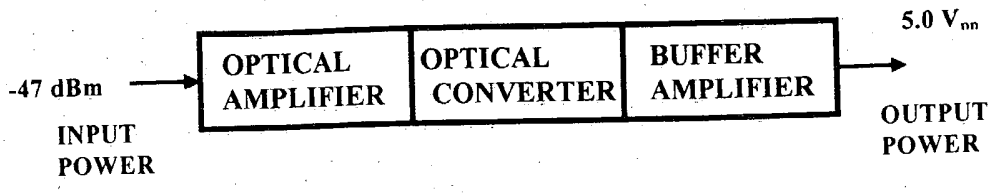

Incident Radiation
Optical Converter
VCSEL optical preamplifier

FIG.8



RECEIVED POWER (dBm)	-47	-17	
GAIN (dB)	30		20
CONVERSION GAIN (V/W)		2500	
OUTPUT POWER (dBm)	-17		
OUTPUT SIGNAL			5.0 V_{pp}

FIG. 9

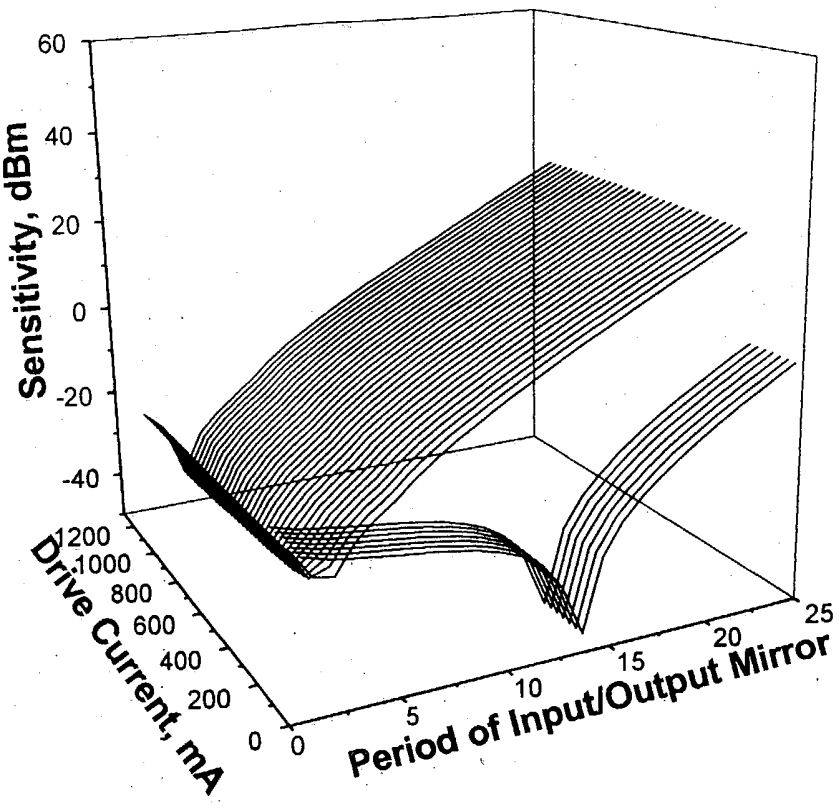

Sensitivity, dBm
60
40
20
0
-20
-40
Drive Current, mA
1200
1000
800
600
400
200
0
0
5
10
15
20
25
Period of Input/Output Mirror

FIG. 10

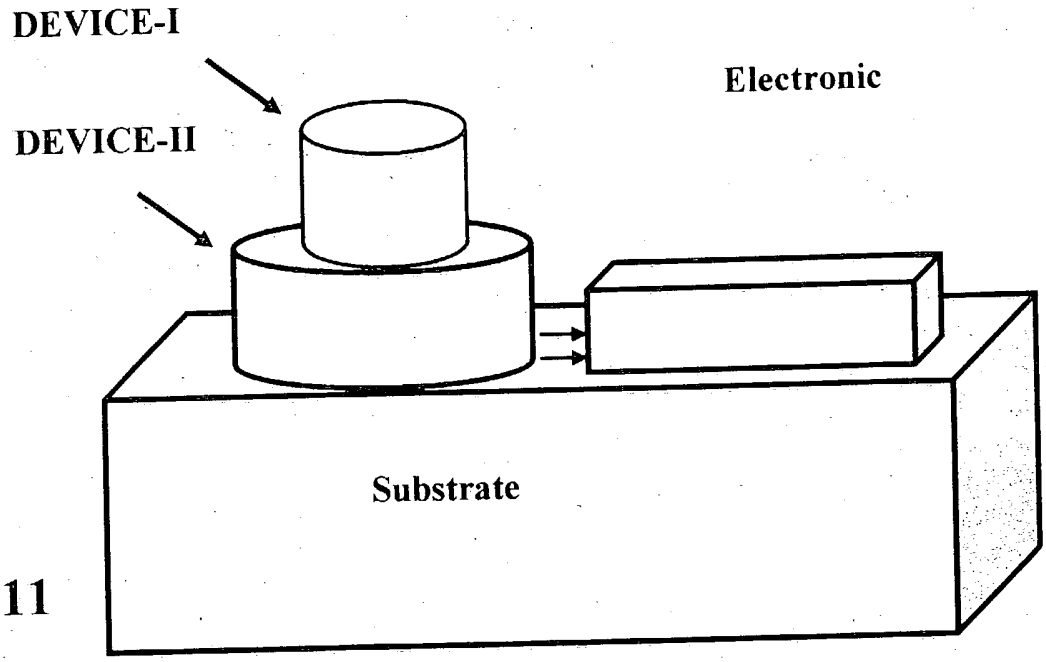


FIG. 11

	DEVICE-I	DEVICE-II	MONOLITHIC CIRCUIT
1	VCSOA	PIN-Diode	Receiver
2	VCSOA	Any DETECTOR	Receiver
3	VCSOA	VCSOA	High gain Optical Amplifier
4	VCSOA	VCSEL	High Power Optical Source
5	VCSOA	EO/EA Modulator	Efficient Optical Modulator

TABLE 1